



gof
Nederlands (Vlaardingen, 1815.) Regeringsvaartuigsdienst, New York.

OF SHIPS AND MEN

1966

The earliest days. When Caesar's legions took possession of the deltas of the Rhine, they found in these lowlands various native tribes for whom a crude system of agriculture was the principal means of livelihood. Yet these tribes, especially those living beside the large rivers and near the coast, must have achieved even in those days a measure of proficiency in shipbuilding. Caesar mentions the fact that his troops crossed the Rhine in ships built by local tribes.

One of Caesar's successors, Germanicus, assembled as many as a thousand ships on 'the Island of the Batavians', now central Holland, for his conquest of the northern coastal lands. Returning from his victories in northern Germany, Germanicus's fleet was dispersed by storms. The native inhabitants aided him in salvaging the ships and making repairs, all of which testifies to the fact that the coastal tribes were used to building, and sailing in, ships. From earliest history, the innumerable inland waterways and lakes covering the Lowlands probably constituted the only means of communication both for commerce and warfare. Practically nothing is known about the type of ships used during the first ten centuries of the Christian era. However, the arms of the cities that flourished in the twelfth and thirteenth centuries usually included a ship, the *kogge* ship being the most common motif. It was a small round ship with a single mast, simple in design at first, but later equipped fore and aft with wooden parapets, called castles.

A treaty concluded in 1296 with the King of France, giving him the exclusive right to acquire ships in Holland and

prohibiting any sales to the King of England, proves that even in those times Dutch shipbuilders had established a reputation abroad.

The open sea beckons. The invention of the ship's compass revolutionized navigation. Around 1300 Flavio Gioja, an Italian, increased the points of the compass to eight; soon afterwards, Dutch navigators increased them to thirty-two. The Dutch division and nomenclature are still recognized internationally.

The discovery of America and of the sea route around the Cape of Good Hope awakened a general desire for the treasures of strange and faraway islands where, until then, only Arab and other oriental traders had purchased fragrant spices for the western markets. Portuguese merchants learnt how to reach these islands and, keeping the sea route a secret, maintained a monopoly of the spice trade. At first, Dutch traders had to be content with bringing these products from Portugal to the northern markets.

All shipping lanes led to Holland. Long before the discovery of America and the sea route to the Indies, Holland had become the center where the countries of northern and southern Europe exchanged and traded goods. Yet seafaring remained a risky enterprise. Even a voyage following the coast from the Baltic countries to

But the Amsterdam merchants preserved. Between 1595 and 1601 no less than fifteen expeditions, totalling 64 ships, sailed from Holland to the Indies. An additional 80 ships opened routes to the West Indies and Brazil. The sharp competition among the many merchant groups and the resulting trade war made the established groups and the West Indies Company (1602) and the West Indies Company (1621) a necessity.

These long and hazardous sea voyages obviously demand better and larger ships than were used for the coastal trade. Ships of 350 lasts (700 tons) became the rule, and by 1607 the East Indies trade included many ships of 500 lasts.

Golden carriages. The seventeenth century came to be called Holland's Golden Age. International commerce called for a central commodities market where merchants from all parts of the world could meet and inspect the goods they came to purchase. Soon Holland, as the obvious meeting place, became the grain center of Europe and the world center for products from the Indies. By the middle of the century there was more trade in Holland than half of all maritime traffic in those waters. In the seventeenth century it reached 70 per cent with a total of more than three thousand ships. Swedish timber and Polish wheat were the principal cargoes. Dutch merchants of those days were so powerful that during the Danish-Swedish war of 1644-45 one Dutch firm supplied the King of Sweden with a complete fleet of 32 ships, including a crew of three thousand, an admiral and a vice-admiral.

In 1610 about 10,000 ships with a total capacity of 600,000 tons and a total crew of almost 100,000 men

A century later, during the early and bloody stages of Holland's War of Independence with Spain and in spite of King Philip's forbidding the Spaniards to trade with the Dutch, more than 400 Dutch merchant ships maintained a steady trade with Spanish and Portuguese ports. The risks and the dangers to Dutch ships and crews increased as the war went on. Dutch merchants decided to seek that mysterious route around the Cape of Good Hope to the Spice Islands and to take the trade in spices away from the Portuguese.

In search of a way around the world. The year 1594 marked the beginning of that period of adventure and enterprise which was to establish Holland's position as one of the foremost seafaring nations in the world. At first three successive efforts to find a way to the Indies through the Arctic seas ended in dismal failure.

In an effort to reach the Indies by sailing around the Cape of Good Hope, another fleet of four ships, manned by 250 sailors and commanded by Van Linschoten, Barendsz, Hemskerk and Houtman, left Holland in April 1595. This first expedition, with all its harrowing details, constitutes a classic in the annals of Dutch navigation. The small fleet managed to reach the Spice Islands, but on

The Dutch burghers recognized the advantages of taking a direct part in the shipping services to northern ports. Commercial treaties were concluded with southern cities, Hoorn, Medemblik, Enkhuizen, Monnickendam, Edam, Zierikzee, Veere. Today they are towns and villages, but in the fifteenth century they were mighty centers, important as agricultural or horticultural commerical ports through which from 60 to 150 ships a year came to the port. In the sixteenth century they were mighty centers, important as agricultural or horticultural commerical ports through which from 60 to 150 ships a year came to the port.

sailed from Dutch ports. By 1634 the number of ships of all sizes had risen to 34,850 with a total capacity of more than two million tons.

The slow boat gets there first. Paradoxically, the golden years in Holland's shipping and commerce were a result of the slowness of the Dutch ships as compared with the ships of other countries.

In the same year that Houtman made his first exploratory journey to the Indies, a resident of Hoorn, Pieter Janszoon Liorne, launched a new type of ship, which was so different from the conventional type that the good burghers of Hoorn sniggered when the unwieldy thing hit the water. Designed and built especially for large and heavy cargoes, the new ship had an immense hull; both the fore and aft parts were round, and the traditional escutcheon was missing. She was jokingly compared to a Dutch clog.

But the ship's designer had the last laugh. Granted his ship was slow, but tremendous cargoes could be stowed in its holds. Moreover, the *fluit* (flute) ship required a smaller crew and thus was less expensive to operate. This new ship proved so satisfactory, and the cost of operation was so low, that all Dutch shipyards immediately set to building *Hoornse Fluiten*. They had soon made Holland the greatest merchant marine nation in Europe.

It is difficult to estimate how large a proportion of the population earned its living on the seas. More than 100,000 seamen sailed distant oceans; in addition, at least 40,000 were employed on the large fishing fleets consisting of thousands of boats. In those early days no employment records were kept, but considering that in the middle 1500's Holland built more ships than all other European countries combined, the manpower in the Dutch shipyards must have been equally enormous.

In 1603 Sir Walter Raleigh wrote rather enviously that the Dutch 'have not one timber tree growing in their own country, nor home-bred commodities to lade 100 ships, and yet they have 20,000 ships and vessels, and all employed.' Ships were built for Louis XIII of France, for the Duke of Tuscany, for Sweden, Russia, and many other countries. Czar Peter the Great of Russia came to



A 'Fluit' ship

Zaandam to learn the shipbuilding trade from the Dutch. Until 1727 the district around Zaandam boasted five hundred wind-driven sawmills, some of which operated more than thirty saws simultaneously. Even though Holland's total population had not even reached the two-million mark, and the country was still engaged in a bloody battle for independence from France, she became the foremost maritime nation in the world.

The law of averages. *The Golden Age* reached its zenith about the year 1700, after which a slow but steady decline set in. There were numerous reasons.

England, France, Russia, and Prussia had expanded their own shipping and their own commerce.

Because of English and Swedish competition, Dutch shipping in the Baltic Sea was noticeably reduced.

Rigidity and stubbornness on the part of the Dutch merchants and shipbuilders were also to blame. They had grown wealthy in the seventeenth century and now could not be budged from their conviction that their methods, which had been so successful in the past, would remain effective in the future. They lost their initiative, and while on the other side of the Channel English shipbuilders provided their vessels with the latest innovations the Dutch clung to their reliable *fluit* ships.

The most serious blow to Dutch shipping came when England decreed that foreign imports could be brought into her ports exclusively on English ships or on vessels flying the flag of the country of origin. The decree remained in force for two centuries and gave England supremacy on the seas of the world.

In addition, Holland carried the burden of four wars against England, at the end of which Holland's navy was all but destroyed. During the last of these four wars (1780-1784), the Dutch merchant marine still maintained a profitable trade with the young United States. However, her trade in European seas was nearly finished.

Next, as a result of the French occupation of Holland, England instituted a blockade. Consequently the Indies trade fell into the hands of the Danes and Americans. And the Prussian and Scandinavian ships pushed the Dutch from the Baltic.

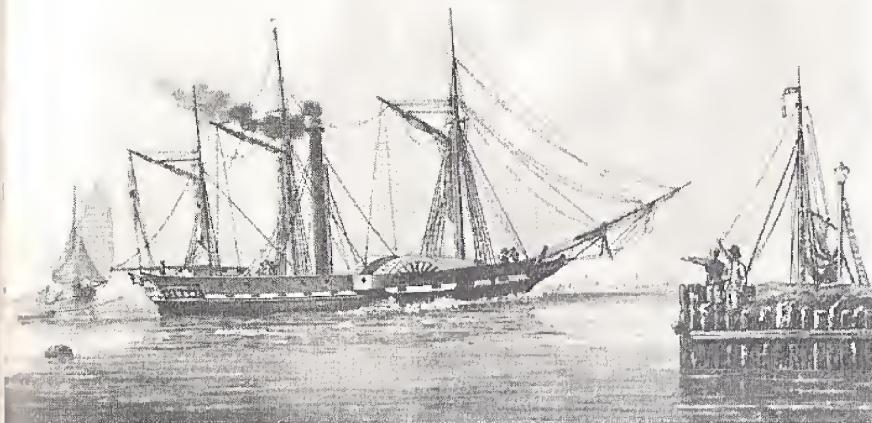
In 1813, after liberation from Napoleon's domination, the Dutch nation was left with only a sad remnant of a once mighty merchant marine. The fleet still counted about one thousand ships, but of these no more than fifty were suited for service on the high seas. Dutch ships, idle for years, were rotting in the harbors. Materials for making repairs were lacking. The shipyards were still intact but could not be put into operation because too many workers had long since gone into other trades.

Re-awakening. To a Rotterdam merchant, Anthony van Hoboken, must go the credit for the revival of Dutch overseas trade. He purchased his ships abroad. Within a year after the country's liberation from the French he sent the first 'postwar' ship to the Indies. During the next decade, some fifty new ships were built in Amsterdam, Rotterdam and Groningen - including six ships for the Indies trade.

Meanwhile, the first steamboat had made its appearance. In 1816, William Wager, an English engineer, demonstrated his 'Defiance' to the King of the Netherlands and the authorities of Amsterdam and Rotterdam. His aim was to obtain a concession for steamboat services on the inland waterways. Several Amsterdam merchants found the new invention of sufficient importance to invest in the enterprise. However, the city fathers vetoed the proposal, 'because it would be detrimental to the mail coach and passenger barge service ...'

At last in 1823 the first Dutch steamship service was put into operation by the *Nederlandse Stoomboot Maatschappij* of Rotterdam. Everywhere new shipping lines were being created: to the Zuyder Zee ports, to Hamburg, England, the East and West Indies. Even though the old sailing-vessels continued in service until the end of the nineteenth century, they were gradually replaced by steamships. To the East Indies fleet, which in 1825 consisted of 45 obsolete sailing-ships, over 250 modern vessels were added in fifteen years.

The conquest of steam over sail was the signal for a tremendous development in long-distance sea voyages and in shipbuilding. Gradually, the Dutch shipyards regained their international reputation. New shipbuilding concerns toiled day and night to meet the demands for larger ships, steamships and motorships. At the beginning of the present century, Holland once again counted among the major shipbuilding nations of the world. In 1905 she ranked sixth in tonnage built; in 1914 she took fourth place. Even with the tremendous international increase in shipbuilding in the period between the two World Wars, the Dutch maintained fourth place.



H.M.S. 'Curacao', the first steamship to cross the Atlantic from East to West (1827).

Between 1914 and the beginning of the Second World War Dutch tonnage more than doubled, while the world's tonnage rose only slightly.

Number and tonnage of ships built

| 1905 | Number | Tonnage | 1914 |
|------------------|--------|-----------|------------------|
| England | 795 | 1,623,168 | England |
| United States | 200 | 302,827 | Germany |
| Germany | 148 | 255,423 | United States |
| Italy | 46 | 61,629 | The Netherlands |
| Norway | 58 | 52,580 | Japan |
| The Netherlands | 58 | 44,135 | Norway |
| Japan | 81 | 31,725 | Italy |
| World Production | 1,576 | 2,514,922 | World Production |

Improvements and innovations. A great improvement in the quality of Dutch ships took place in the decade preceding the last war. The tonnage of ships less than five years old rose from 8.9 to 19.1 per cent between 1936 and 1939. In 1938, 142 new ships left the Dutch yards, the highest figure ever recorded during the past 100 years. At the outbreak of war only 20 per cent of Holland's tonnage was over 20 years old; no other country could claim such a record.

In 1939, 57 per cent of the merchant marine consisted of motorships, as compared to 25 per cent for the merchant marine of the entire world.

Second World War. When the Second World War brought Holland under enemy occupation, a large part of her merchant fleet was on the seas. Other ships managed to escape seizure by the Germans. Thus, the Dutch merchant marine was able to contribute fully to the war effort. But the losses were heavy. Thirty-three hundred Dutch seamen perished during the war and Holland lost half of her fleet.

In May 1945 Holland's shipping was in a sorry state. The merchant navy was left with 305 ships (of 500 tons or more) with a total tonnage of 1,519,930 and 387 smaller

| 1938 | Number | Tonnage | 1945 | Number | Tonnage |
|------------------|--------|-----------|------------------|--------|-----------|
| England | 656 | 1,683,553 | England | 267 | 1,030,375 |
| Germany | 89 | 387,192 | Germany | 193 | 480,797 |
| United States | 94 | 200,762 | Japan | 146 | 441,720 |
| The Netherlands | 130 | 118,153 | The Netherlands | 142 | 239,845 |
| Japan | 32 | 85,861 | United States | 105 | 201,251 |
| Norway | 61 | 54,204 | Italy | 13 | 93,503 |
| Italy | 47 | 42,981 | Norway | 42 | 54,654 |
| World Production | 1,319 | 2,852,753 | World Production | 1,119 | 3,033,593 |

ships totalling 98,041 tons. This was only about 57 per cent of the pre-war total tonnage; in addition, a large part of the fleet was not suitable for immediate employment. The passenger vessels were in a particularly bad condition; repair materials were scarce and costly. In the early post-war months only one million tons of shipping was seaworthy.

Return to the sea. However, the Dutch fleet was rapidly rebuilt. First, Holland acquired a number of American ships, such as the Liberties, the Victories, the T2-tankers and other types. By 1948 Dutch shipping had reached its pre-war tonnage, and has grown steadily since.

An important increase in freighter tonnage since 1939 is due to the fact that the ships are generally larger. Moreover, since the war there has been a tendency towards the building of specialized ships for specific cargoes.

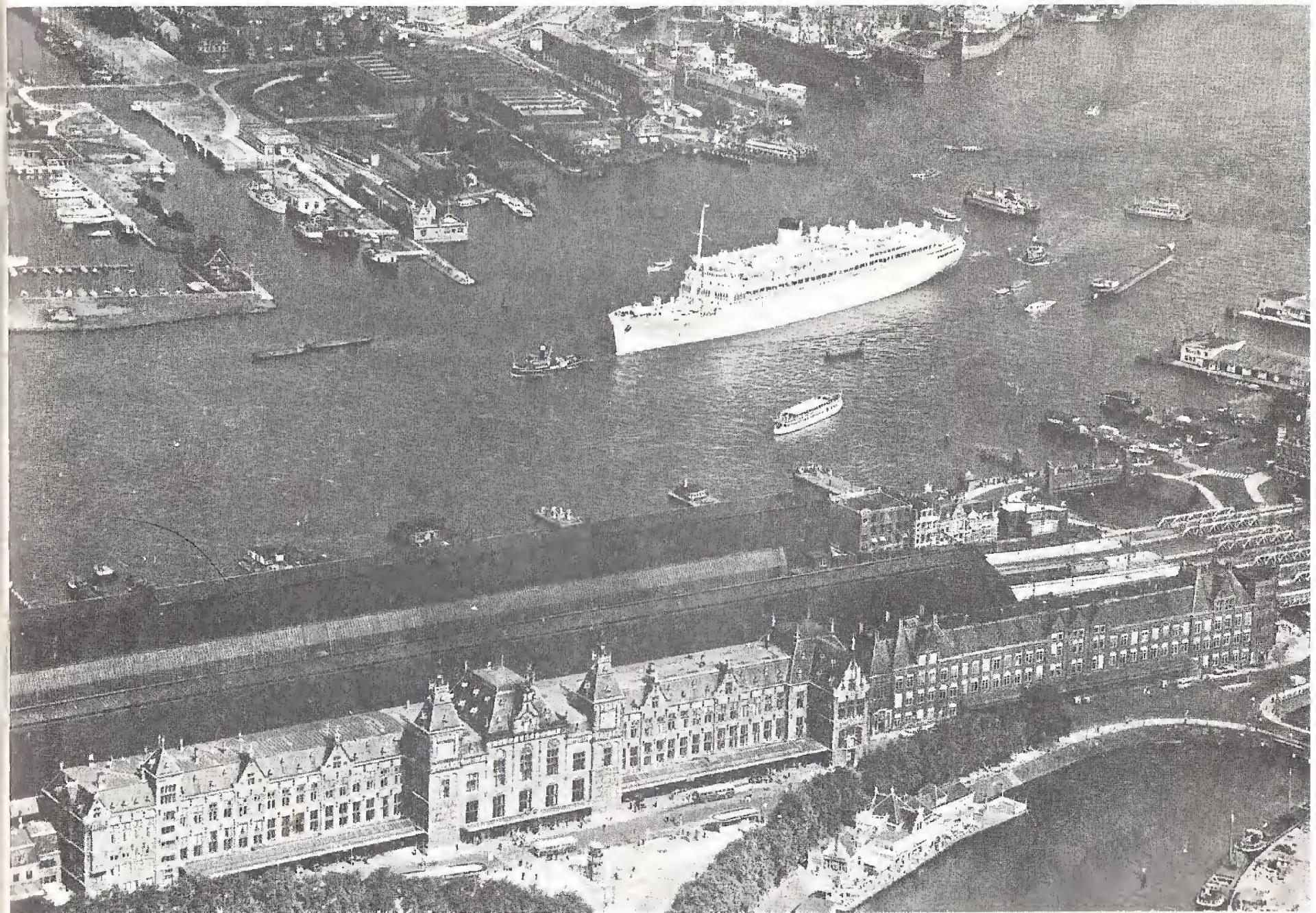
To meet the needs of the large oil companies, shipbuilders have concentrated on vessels of greater tonnage, available for chartering. At the same time, the oil companies increased their own fleets. The largest tanker afloat under the Netherlands flag weighs 68,843 tons. Still larger vessels, among them one of 84,300 tons, are on order. Several reasons account for the enormous tonnage increase in coastal shipping. Before 1940, wood from the Baltic states was shipped mostly by steamers of 3,000 tons.

Merchant ships under the Netherlands flag

| Year | Freighters | | Tankers | | Passenger Ships | | Ships under 500 B.R.T. | | Total | |
|------|------------|-----------|---------|-----------|-----------------|---------|------------------------|---------|--------|-----------|
| | Number | Tonnage | Number | Tonnage | Number | Tonnage | Number | Tonnage | Number | Tonnage |
| 1939 | 435 | 1,631,747 | 109 | 528,029 | 49 | 564,277 | 536 | 129,908 | 1,129 | 2,853,961 |
| 1945 | 205 | 884,379 | 74 | 357,071 | 26 | 278,523 | 387 | 98,041 | 692 | 1,618,014 |
| 1948 | 348 | 1,580,197 | 88 | 453,855 | 31 | 340,265 | 441 | 116,398 | 908 | 2,490,715 |
| 1951 | 406 | 1,891,300 | 114 | 618,996 | 35 | 364,994 | 612 | 184,114 | 1,167 | 3,059,404 |
| 1954 | 409 | 2,035,135 | 109 | 647,574 | 33 | 346,768 | 736 | 253,163 | 1,287 | 3,282,640 |
| 1957 | 434 | 2,200,444 | 132 | 1,071,385 | 36 | 375,876 | 867 | 322,256 | 1,469 | 3,969,961 |
| 1959 | 446 | 2,475,576 | 126 | 1,272,135 | 34 | 398,201 | 958 | 378,885 | 1,564 | 4,524,797 |
| 1961 | 445 | 2,594,996 | 100 | 1,447,379 | 31 | 407,893 | 958 | 381,050 | 1,534 | 4,831,318 |

The fleet of passenger ships now boasts: the 'Statendam' (1957 - 24,294 tons) and the 'Rotterdam' (1959 - 38,645 tons). In addition, ships in service were redesigned and modernized, and their passenger accommodation enlarged. However, the change in relations between the Netherlands and Indonesia has left its mark on passenger traffic to the Pacific.

During the war a large part of this fleet was lost. Modern coastal steamers have replaced them. They require a smaller crew and can be operated more economically. Consequently various shipping companies now order this type of ship, which is also in demand for 'feeder' service, shipping cargo to the larger ports for overseas traffic.



M.S. 'Oranje' in Amsterdam harbour.

THE GOOD OLD DAYS



The 'trekschuit', or canal barge, in the mid-nineteenth century.

One-horse power. The days of Holland's water-borne passenger transportation came to an end long ago. However, the image of a horse-drawn barge has been preserved in the works of painters and writers, who at the time were struck by the poetic quality of this conveyance. Up to the end of the nineteenth century, a traveler in the Netherlands knew only one mode of transportation, the canal barge, *trekschuit*. These flat-bottomed vessels were towed over the waterways by a horse walking along the towpath. For this type of passenger traffic between many cities, special canals were dug, the first one in 1638 between Amsterdam and Haarlem. The *trekschuit*, literally: towboat, remained popular until long after the first railroads, and for more than two hundred years it contributed to the pastoral aspect of the Dutch landscape.

In 1880, the Italian writer Edmondo de Amicis wrote, 'The *trekschuit* is the traditional bark, as typical of

Holland as the gondola is of Venice.' Esquiros, a French contemporary of de Amicis, called it 'the genius of Old Holland, floating on the water.' Esquiros gives a vivid description of canalboating in the olden days: 'She is a large boat almost entirely covered by a sort of house in the shape of a diligence; upon the prow rests an iron ringbolt, guiding the rope which runs from the stern to the horse on the shore. The windows of this small boat-house are hung with white curtains; the walls and doors are painted in gay colors; there are cushioned seats, a table with a few books, a closet, a mirror; and everything shines with cleanliness. The helmsman gave the signal, the horseman mounted and the *trekschuit* moved gently through the water. The countryside was hidden from view by rows of elm and willow trees and by high hedges bordering the canal. We seemed to be sailing through woods. At every turn we saw green fields surrounded by trees and every so often a

windmill on the bank. We came to a bridge. We enjoyed watching the agility with which the boatmen handled bridge traffic, often skimming past another *trekschuit* coming from the opposite direction. All along the waterway the only sound we heard was the whirr of windmill sails.

At various spots amid the greenery we made out a cluster of houses - a small many-colored village - with tulips on the windowsills. Nothing stirred, but at times the profound silence was broken by a lively air from the bells of some hidden belfry. It was a pastoral paradise, an idyllic landscape, full of freshness and mystery; a Chinese Arcadia of

unexpected, innocent charm, as if small voices were whispering their contentment.

To understand the poetry of the canalboat, one should take a long trip in the company of Dutch people, and see how the passengers make themselves at home, the women with their needlework, the men talking and smoking on the deck; people seem like one family. Night comes and the *trekschuit* glides like a shadow through the sleeping village... In that profound peace, with the slow and balanced motion, the travelers fall asleep side by side, one after another, and in the wake of the boat only the soft murmur of the water breaks the silence of the night.'

INLAND SHIPPING

The Utrecht ship. River transportation of goods and passengers in the Netherlands predates recorded history. From the various parts of the country the inhabitants used to come down the rivers and streams to trade the hides of their cattle and the hair of their women for the goods of Roman traders.

A relic of those early days is a ship excavated in 1930 by the Public Works Department of the city of Utrecht in the center of Holland. The workmen came upon a well-preserved ship sunk at the bottom of what must once have been a river. According to Dutch archaeologists the ship dated back to the first centuries of the Christian era.

The vessel, now restored and on show in a museum at Utrecht, is made entirely of oakwood. She measures 59 feet long and twelve feet wide. Of special interest is the heavy bottom consisting of a single piece of curved wood measuring 47 by 6 feet and $2\frac{1}{2}$ inches thick, apparently

cut from a gigantic oak tree, all joints pegged. The stem is considerably higher than the stern, which indicates that





An 'overtoom', or causeway.

the ship had done service in rough waters, probably on the large rivers.

Her graceful, slender lines bear witness to the high level of development in inland waterway traffic and the building of river boats at the time. The ship bears a striking resemblance to a certain type of Rhine barge which was put into use centuries later and which remained the principal means of water transportation until modern times.

Sailing across the dam. Of the 4,620 miles of Dutch waterways, only about 700 miles are natural waters; the remaining 3,931 are built by man.

The construction of canals in the seventeenth century made it possible for larger boats to use these waterways.

The gradual development of a canal system in Holland was accompanied by bickering and strife between cities, for most of them owed their prosperity to their favorable location on some river or stream, and they feared the competition resulting from newly developed waterways. This competition often led to absurd situations. To prevent outsiders from using 'their' streams, cities built dams leaving only a narrow channel for small vessels. Larger ships had to make use of a causeway ('overtoom') for which toll charges were payable. Dutch causeways were of primitive but ingenious construction. They consisted of greased planks laid across the dam. The ship was hauled across the causeway onto the dam with the help of the ship's tow horse. Endless squabbles and court disputes kept these causeways in existence for hundreds of years.

Holland's inland fleet. Throughout the centuries the inland waterways of the Netherlands remained the foremost means of communication between the towns and villages. Transport by barge was cheap and relatively safe. The waterways have also been of major importance in promoting urban development and communication between inhabitants of different districts.

Most of the western part of the Netherlands consists of *polders*, drained marshland surrounded by dikes. These *polders* require a tight network of waterways along the dikes for the removal of excess water from the lowlying land to the sea. Over the years these waterways have been steadily adapted to the needs of traffic, resulting in an excellent water transport system throughout the country. Nearly all the provinces are connected by waterways capable of taking ships of at least a 1,000-ton carrying capacity.

Before the war the combined carrying capacity of Holland's inland fleet was close to five million tons, divided over some 20,000 ships (not including boats below 20 tons). The war brought heavy losses, one million tons were totally destroyed, and another million tons so severely damaged that only a small proportion could be put back into service.

However, repairs and new construction brought the inland fleet near to pre-war level, with 19,242 ships of all types and tonnage. There are now over 1,000 tankers, some 13,500 dry-cargo ships and about 2,100 tugs.

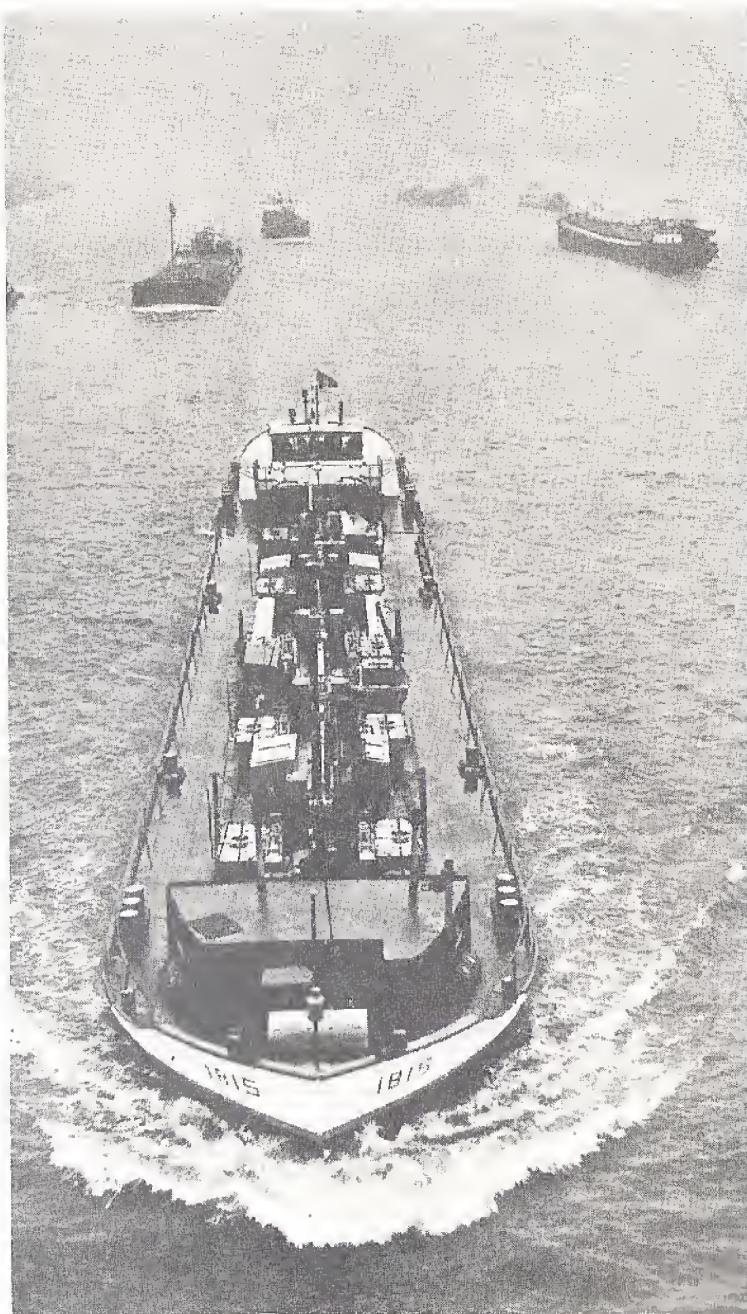
Tugs powered by combustion engines are replacing steam tugs since they are more economical to operate.

The majority of the barges and tugs were built in Dutch shipyards. These boats are often of welded construction in order to save weight; for the same reason more and more aluminum and other light materials are used for hatches and living-quarters.

Inland shipping in the Netherlands is keeping pace with the times. A growing number of vessels are equipped with radiotelephone and radar; this has made possible the recent introduction of barge trains.

Inland shipping on the River Noord near Dordrecht. ▶

979.031



Even though the Dutch are continually modernizing their railways by electrification and diesel power, and are going forward with new road building, the waterways are still of prime importance to the nation's economy.

In the twenty-year period preceding the war, water freight transportation has almost doubled.

Freight carried by water

| | Domestic (million tons) | International |
|------|----------------------------|---------------|
| 1910 | 14.0 | 35.0 |
| 1920 | 19.9 | 22.2 |
| 1925 | 28.4 | 48.2 |
| 1938 | 31.9 | 66.1 |
| 1959 | 53.0 | 75.0 |
| 1961 | 61.4 | 88.8 |

In 1961 water transportation accounted for 34.3 per cent of all domestic freight, railways for 5.5 per cent, and trucks for 60.2 per cent.

RHINE SHIPPING

Golden cargo. The principal arteries of Holland's international commerce and transportation are the Meuse and the Rhine. The Rhine is of paramount importance to Holland. Until the end of the eighteenth century, Rhine traffic below Cologne was exclusively in the hands of the Dutch who either as merchants or as carriers brought the products of middle Europe from the central market in Cologne to the Dutch markets. Beyond Cologne the Rhine trade was the privilege of the cities of Cologne and Mainz. For centuries they maintained the right to levy duty from any passing vessel or to sell its cargo in their market. All

cargoes for the Upper Rhine had to be trans-shipped twice, once in Cologne and again in Mainz.

The expansion of the coal and iron industry in the Ruhr district and the growing need for cheap transportation of bulk goods changed the situation. The principle of freedom of navigation on all international rivers, first proclaimed in 1792 by the French Republic, was codified by the Congress of Vienna in 1815. Finally in 1868 the Mannheim Convention was signed, which stipulated that navigation on the Rhine from Switzerland to the seaports in the Netherlands should be free to the vessels of all nations for the transports of goods and passengers.

The low cost of inland water transportation helped the rapid development of the Ruhr industries, which in turn made further expansion of the Rhine fleets necessary. Dutch Rhine ships became the freight carriers between the Ruhr area and the North Sea, with Rotterdam as the main transit harbor for this branch of German industry. Iron ore from Sweden, Spain, and Africa were trans-shipped at Rotterdam onto the Rhine barges, which, on the way down, had been loaded with coal and industrial machinery for other European countries from the Ruhr. When further industrialization of the Ruhr area required additional wheat for the expanding population, Rotterdam became the transit port for wheat also.

Expanding Rhine traffic created a big demand for tug-drawn Rhine barges. In the 1880s these barges were only 800 tons in weight, but soon they increased in size. Nowadays 2,500-ton barges are not exceptional.

In 1961 nearly 68.4 million tons of freight passed on the Rhine at Lobith, a Dutch town on the German border. More than 51.8 per cent of these vessels sailed under the Netherlands flag. Shipping traffic at this border-post annually comprises 16,900 tugs, 39,400 towed barges and 115,900 selfpropelled barges. The main freight consists of bulk goods to and from Switzerland, the eastern part of France, Germany, the Netherlands and Belgium, compris-

ing pit coal, ores, wood, grain, liquid fuels, chemical products, fertilizers, sand, gravel, semi-finished and finished products from the iron and steel industry, and many kinds of piece goods.

About two-thirds of the freight goes through the port of Rotterdam; other Netherlands seaports, mainly Amsterdam, and the Belgian seaports, also get their share of the Rhine freight.

A TALE OF TWO CITIES

The historical records, more or less similar, of Holland's two principal cities, Amsterdam and Rotterdam, constitute a remarkable story of initiative and tenacity. They both grew from insignificant villages into major world ports and managed to retain this status through the centuries. Both cities are located at considerable distance from the sea, Amsterdam 15 miles, Rotterdam, 18.6 miles; both owe their prosperity to overseas shipping and commerce. The history of their development into modern seaports is a tale of recurring struggles against shifting sands and waters and of unending efforts to create shorter and more reliable outlets to the sea.

Amsterdam. In the sixteenth century Amsterdam was able to maintain its standing as the country's principal mercantile center and one of the leading Zuyder Zee ports, mainly because of the smallness of the sea-going ships, which had no trouble finding their way through the fairly deep channels of the generally shallow inland sea. But as ships grew larger, up to 1,000 tons, the notorious Pampus mudbank, blocking the entrance to Amsterdam harbor, became a threat to the city's shipping.

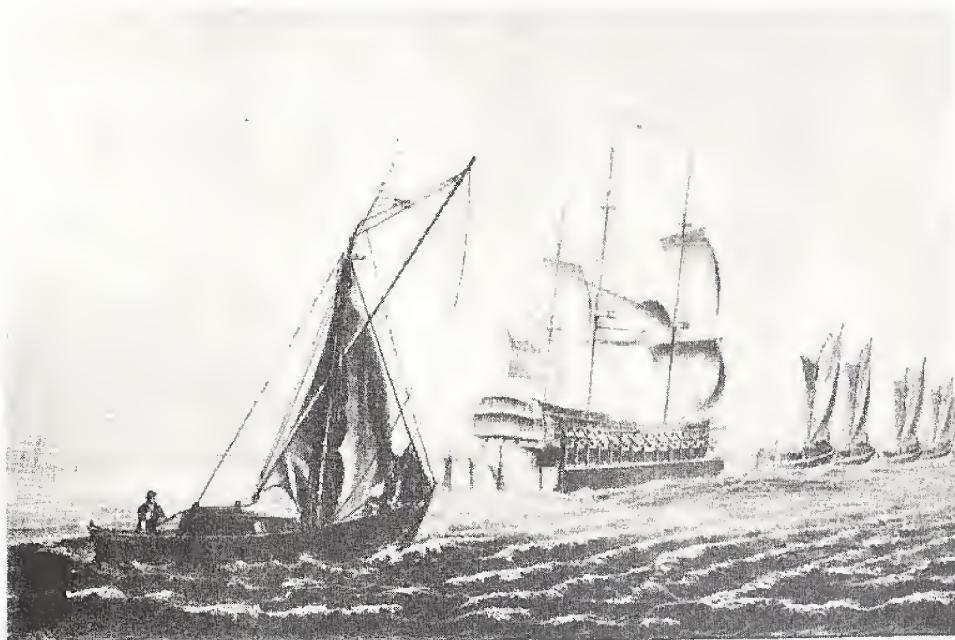
In 1690 an ingenious Hollander, Meeuves Bakker, invented 'ships' camels', which consisted of two separate

concave drums: the latter were filled with water, chained together under the ship, and then emptied. In that way they lifted the ship high enough for it to be towed over or through the mud of the Pampus bank. This cumbersome and costly method of bringing ships into and out of the harbor was used for 135 years.

The Pampus bank was not the only obstacle that encumbered Amsterdam. Its harbor, too, was in constant danger because of the incessant inflow of silt and mud from the Zuyder Zee. The Amsterdam merchants lived in fear that their harbor would share the fate of the once wealthy mercantile city of Bruges. Dredges worked day and night to remove the silt from the harbor, but the technical equipment available in those days was unable to cope with the inrushing streams of mud.

Even after the ships had been lifted across the mud bank, there was still the 95-mile route through the Zuyder Zee to be navigated before the North Sea was reached. This roundabout way became more and more of a disadvantage in the growing competition with foreign carriers.

Amsterdam escaped the fate of so many other Zuyder Zee ports, thanks to the energetic action of King Willem I. Under his persistent prodding, extensive harbor works for Amsterdam were planned, and in 1824, the circuitous Zuyder Zee route could be abandoned for the 50-mile



'Ships' camels'.

North Holland Canal, stretching from Amsterdam to the northern tip of the province.

Yet, even under the best conditions, the canal passage took nineteen hours.

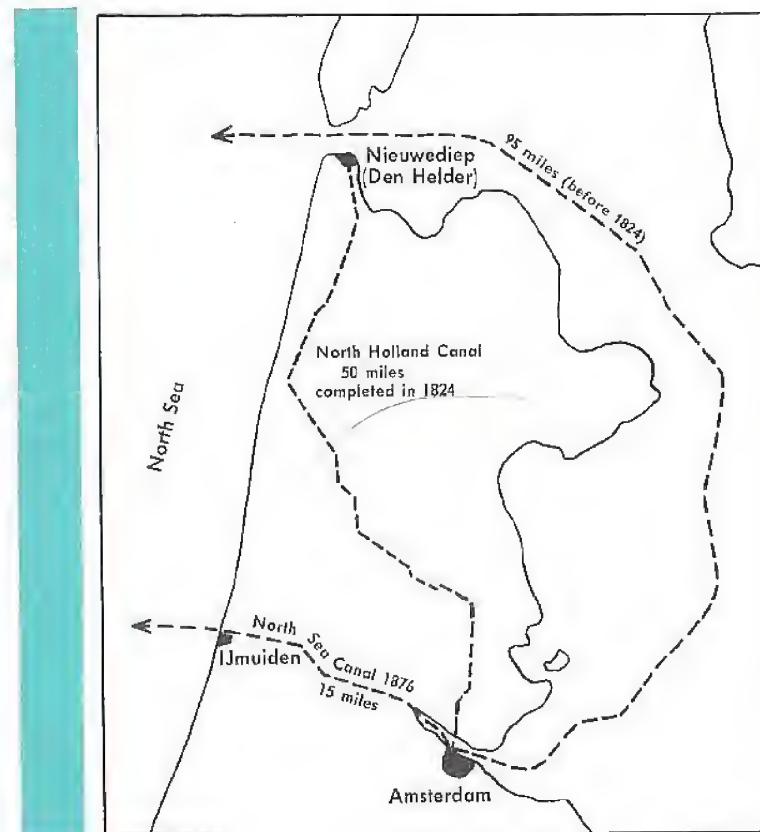
In addition, the completion of the North Holland Canal coincided with the advent of the steamboat, which the planners had failed to take into account when preparing their blueprints. The large paddle wheels of the new steamers churned the water over the banks. The farmers along the canal feared that their land was being ruined. As the ships became larger and the number of incidents on the canal increased, many Amsterdam merchants loaded and discharged their cargo at the northern end of the canal, transporting their goods inland by train. Economically, the North Holland Canal was, and has remained, a white elephant.

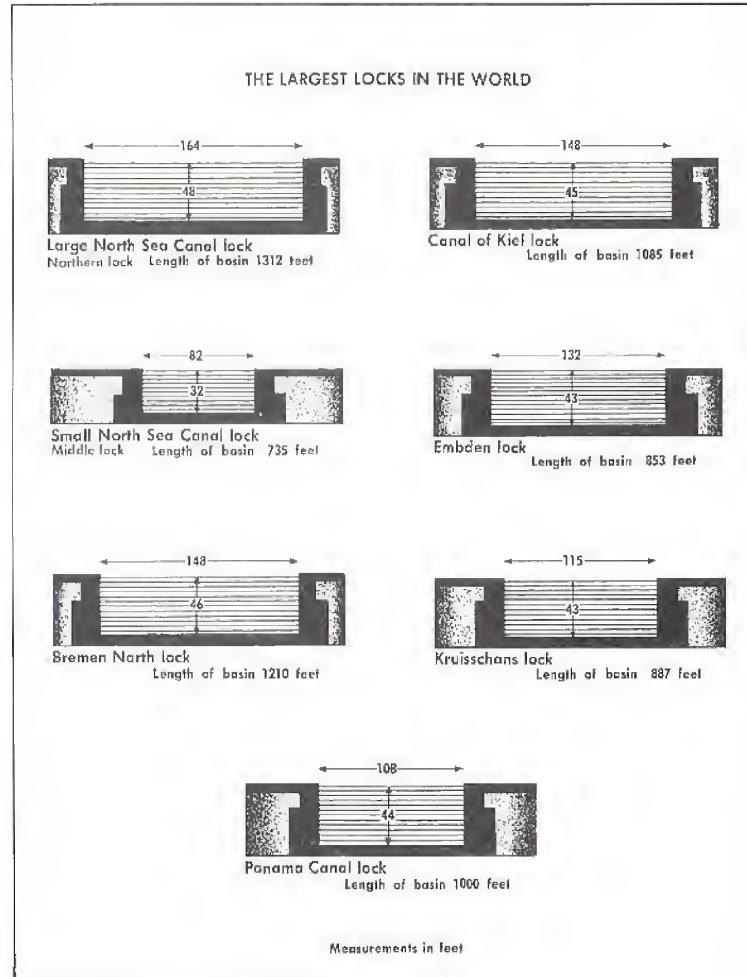
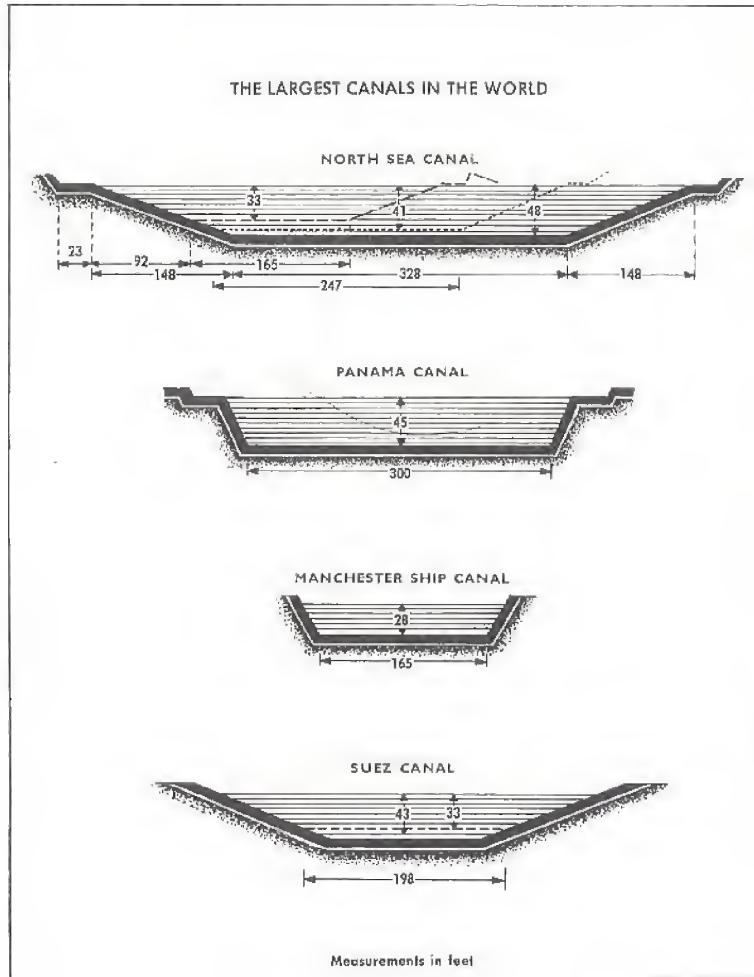
But what the experts had declared impossible in 1826 was

successfully and magnificently achieved in 1876: the completion of the North Sea Canal.

At last Amsterdam had a direct and rapid connection with the North Sea, and 1876 marks the city's comeback as a seaport of international importance. As ships gradually assumed the dimensions to which we are accustomed today, the canal had to be widened and deepened repeatedly. Its present width at the bottom is 164 feet, its width at the top 246 feet, its depth 39 feet. When new expansion plans have been carried out, its depth will be 49 feet and its bottom width 328 feet.

Just as the North Sea Canal is the widest and deepest in the world, so the locks at its entrance at IJmuiden are the



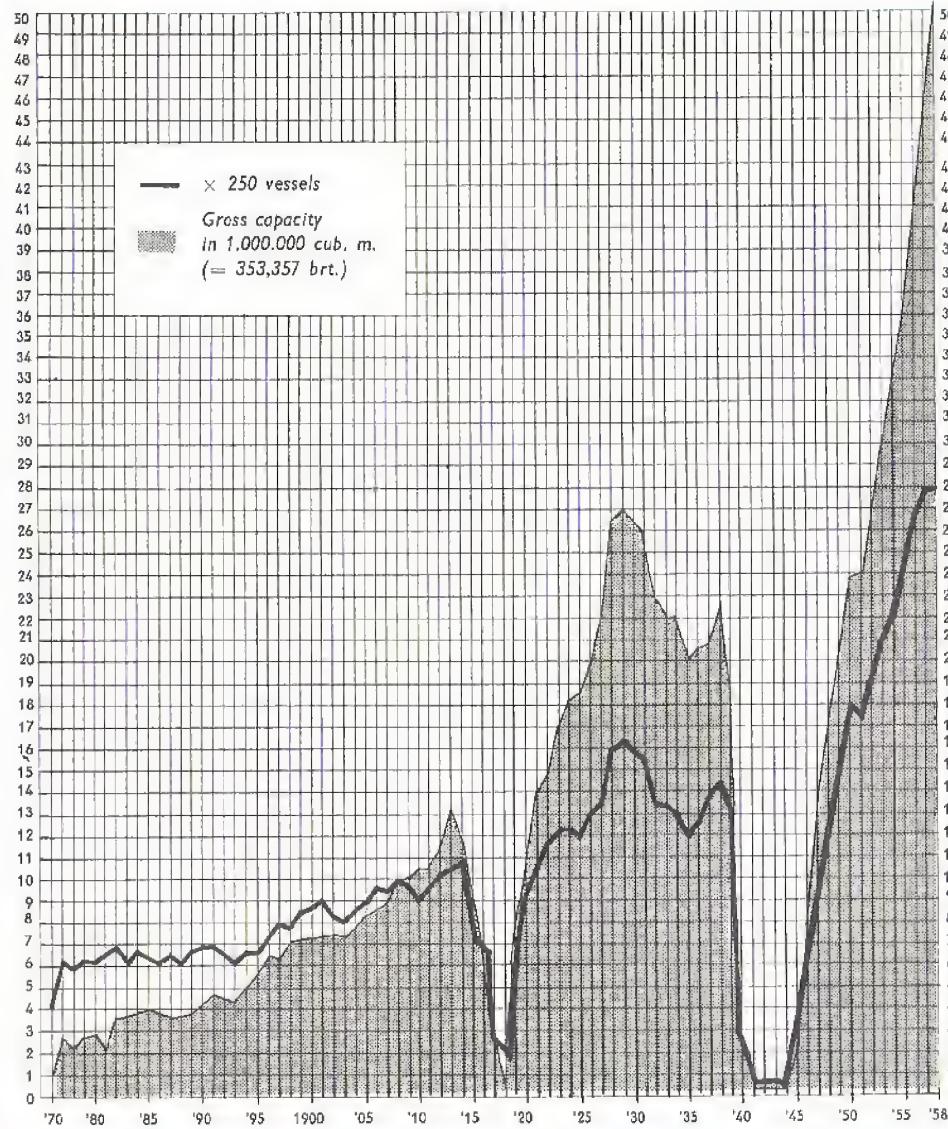


largest of their kind. They consist of three separate locks, the smallest built in 1876, the largest, the North lock, completed in 1923. This North lock is 1,320 feet long, 165 feet wide and 48 feet deep. It rests on 20,000 concrete pillars, and its two gates each contain two and a half million pounds of steel.

Among the large shipping-lines that have their offices in

Amsterdam are: the *N.V. Stoomvaart Maatschappij 'Nederland'* (Nederland Line Royal Dutch Mail), with 40 ships, maintaining passenger services to Australia and around the world and freight services to the Philippine Islands and between United States ports to South Africa, the Near East and the Pacific; the *Koninklijke Java-China-Paketvaart Lijnen N.V.* (Royal Inter-ocean

Arrivals of ocean liners since opening of North Sea Canal



Lines), with 32 ships, maintaining passenger and freight services in the Pacific to South America via South Africa; the *Koninklijke Nederlandsche Stoomboot Maatschappij N.V.* (Royal Netherlands Steamship Company), with 88 ships, maintaining passenger and freight services to the West Indies, South American Pacific ports, from the Caribbean area to the United States and Canadian Atlantic ports, and in the European area; and the *N.V. Koninklijke Paketvaart Maatschappij* (Royal Packet Navigation Company), with 40 ships, maintaining passenger and freight services in the Pacific to the Arabian Gulf and from East Africa to the Arabian Gulf.

| Sea-going vessels (number) | Total bulk goods (in 1000 tons of 1000 kg) | | General cargo (in 1000 tons of 1000 kg) | |
|----------------------------|--|------------|---|------------|
| | tot. inw. | tot. outw. | tot. inw. | tot. outw. |
| 1938 | 3,464 | 2,182 | 655 | 1,303 |
| 1955 | 6,187 | 3,149 | 822 | 1,645 |
| 1956 | 6,837 | 4,948 | 925 | 1,631 |
| 1957 | 7,118 | 6,318 | 1,045 | 1,710 |
| 1958 | 7,107 | 7,005 | 784 | 1,605 |
| 1959 | 7,219 | 5,328 | 939 | 1,655 |

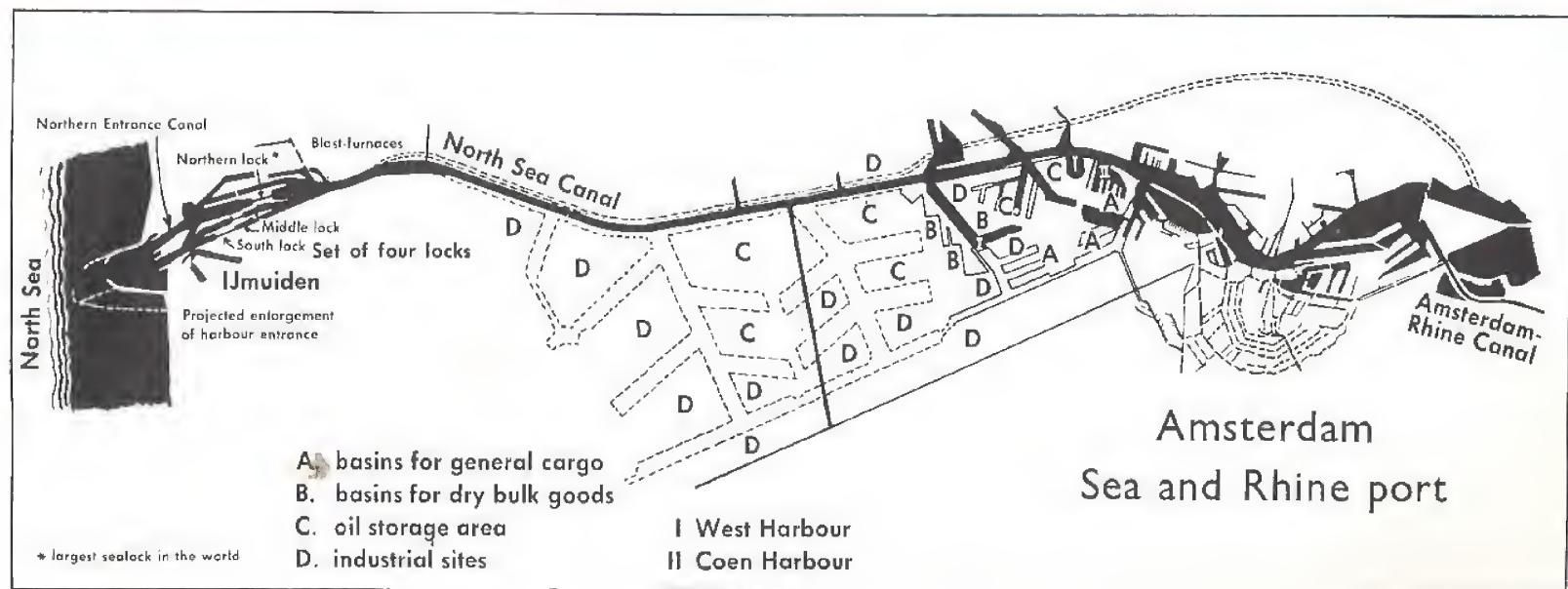
The increase in transportation, trans-shipment and storage of bulk goods in the port of Amsterdam since 1954 is, to a large extent, a result of a growing demand on the part of Dutch and other West European industrial concerns.

Up to a few years ago, an oil or ore carrier of twenty or thirty thousand tons was regarded as an outsize ship. More recently, however, it has been demonstrated that even larger vessels can be profitably used for the transportation of bulk cargoes to Europe. Today a 60,000 ton ore carrier and even a 100,000 ton tanker are unexceptional.

The future of Amsterdam as a port is bound up with the future of Western Europe. The European Economic Community, working towards the integration of the



Europe's largest oil storage depot in Amsterdam harbour.



economies of its member nations, will eventually speed up the exchange of goods, thus causing a rise in living standards. Continuous efforts are being made to keep facilities abreast of the requirements of today and the demands of the future.

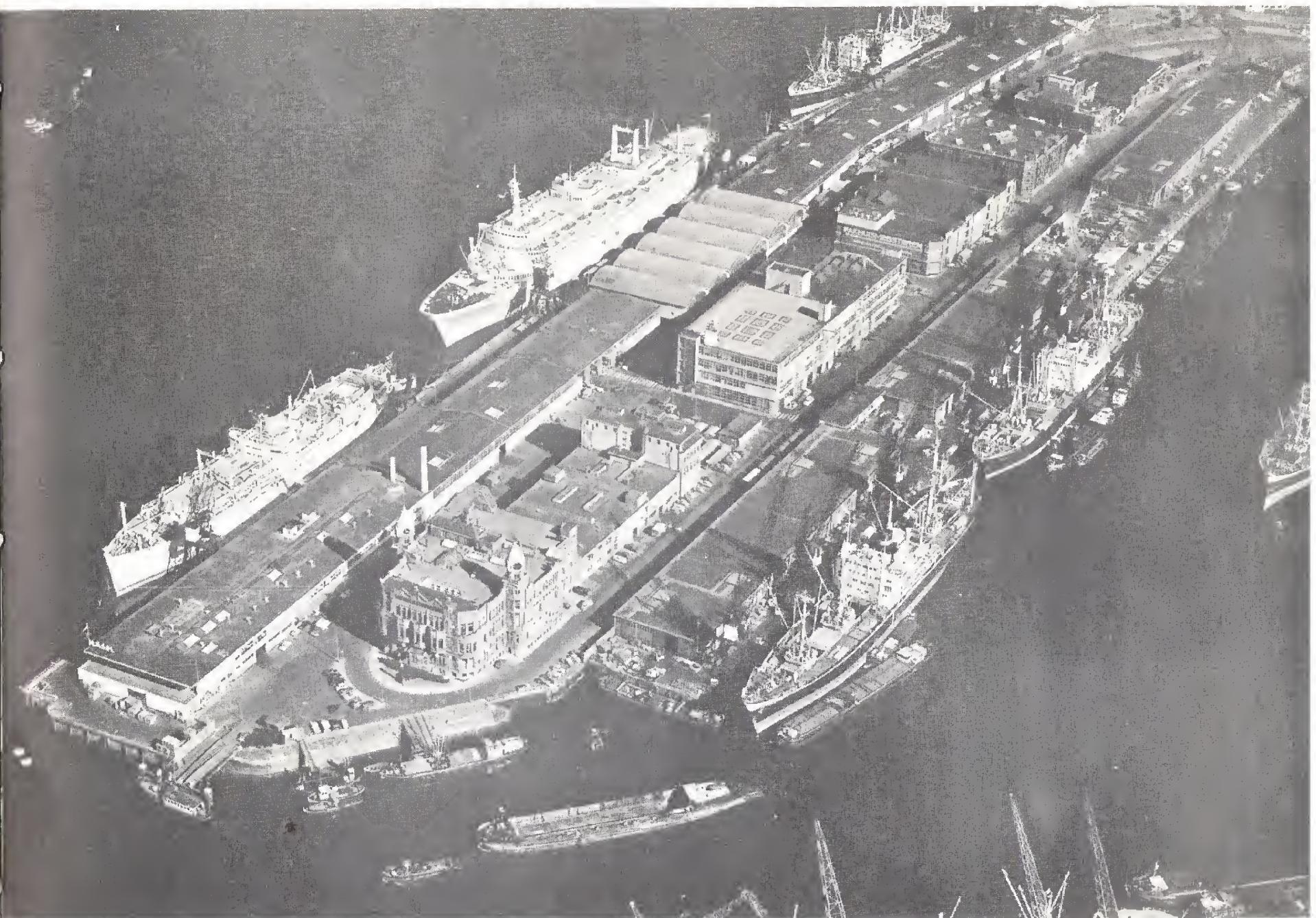
Europe's production machine will be faced with the necessity of turning out more and more goods for export in order to meet the expense of increased imports. Amsterdam, as an important shipping-center, will meet the challenge.



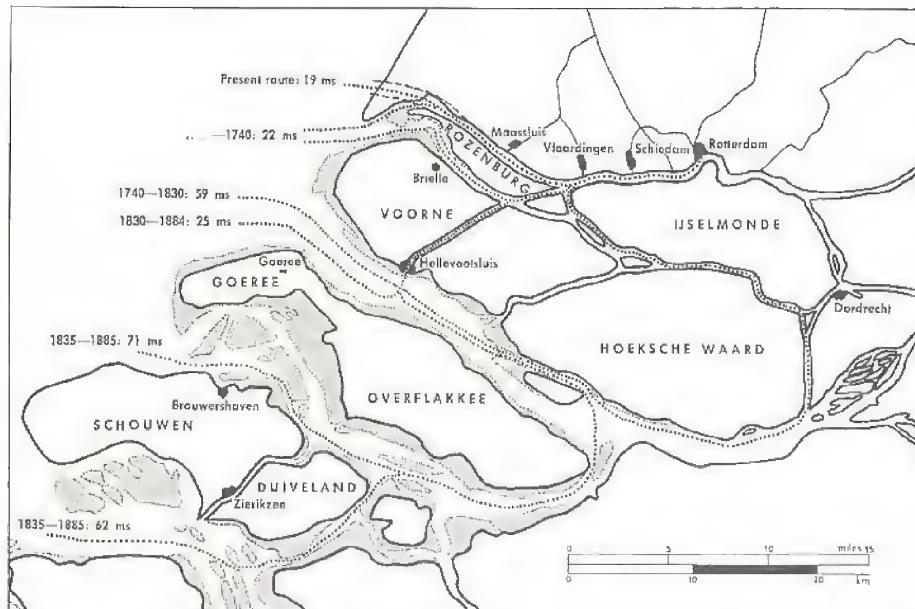
Rotterdam. A hundred years ago, the port that today is the world's largest after New York was no more than an obscure dike village located by the North Sea at the mouth of the Rhine and the Maas. The growth of Rotterdam from a herring fishery to a world port is due to the genius of Pieter Caland, who gave Rotterdam direct access to the sea.

The construction of the Nieuwe Waterweg (New Waterway) between 1866 and 1884 linked Rotterdam with the Hook of Holland. It bypassed the tortuous and silted mouth of the Maas and provided a lock-free, bridge-free, sand-free channel from the North Sea to the main streams of the Rhine delta. A mighty industrial region developed in the Ruhr and along the Rhine. Rotterdam, the region's outlet to the sea, grew larger as industrial traffic increased. The first phase of its new life came to an end with its destruction in the Second World War.

Great changes have taken place since the war in the character of Rotterdam as a city, and they have affected its character as a port. Even before the war, Rotterdam's favorable location at the mouth of the Rhine had made it Europe's biggest port after London, but most of the cargoes it handled were in transit to and from the countries of Western Europe. The Netherlands lagged behind in industrial development. Rotterdam dealt with only a relatively small import and export trade. Since 1945 the Netherlands has sought to strengthen her economy by a policy of industrial development, much of which has taken place in and around Rotterdam and along the New Waterway, particularly in basic modern industries such as oil and petro-chemicals. The result has been a mighty increase in the volume of goods handled by the port, from 40m tons in 1938 to 90m tons in 1961, and a new threefold character for Rotterdam; first port in Europe, Holland's foremost industrial area, and main gateway through which the growing import and export trade of the Netherlands flows. The industrial and port area was built before 1940 mainly to receive oil tankers and for the, then modest, oil industry. The capacity of the Royal Dutch Shell refineries was 700,000 tons of crude oil before the war. Today the capacity of the new refineries, rebuilt and then enlarged, is over 15m tons, making them the largest in Europe.



The Holland America Line complex in Rotterdam harbour.



The different routes of access to the port of Rotterdam through the centuries.

The push boat 'Olivier van Noort' in action.



By 1948-49 it was clear that the existing facilities would soon be inadequate. Plans were made for Rotterdam's westward expansion. Early in 1952 the vast Botlek project was undertaken to provide a further 3,500 acres of industrial and port facilities. Botlek docks, like all the others, are directly connected with the New Waterway and the sea, and can take oceangoing vessels up to 48,000 tons.

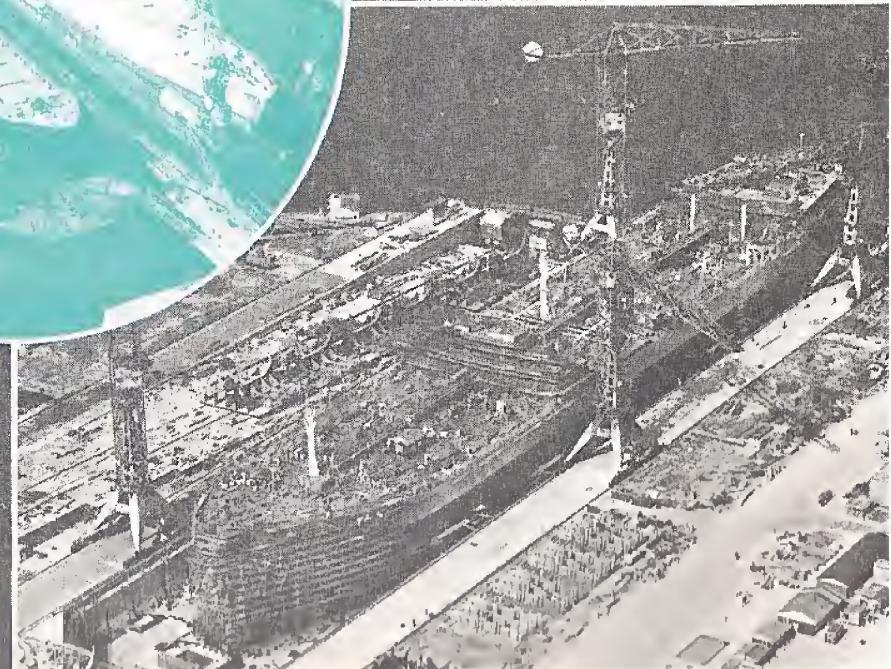
Still more recently, further expansion has been conceived for the mouth of the Waterway. This is Europort. Europort will extend over some 3,875 acres excluding the dock basins; it will be in direct communication with the sea, and the quays will be accessible to ships of 85,000 tons, up to 850 feet in length, and with a draught of about 47 feet.

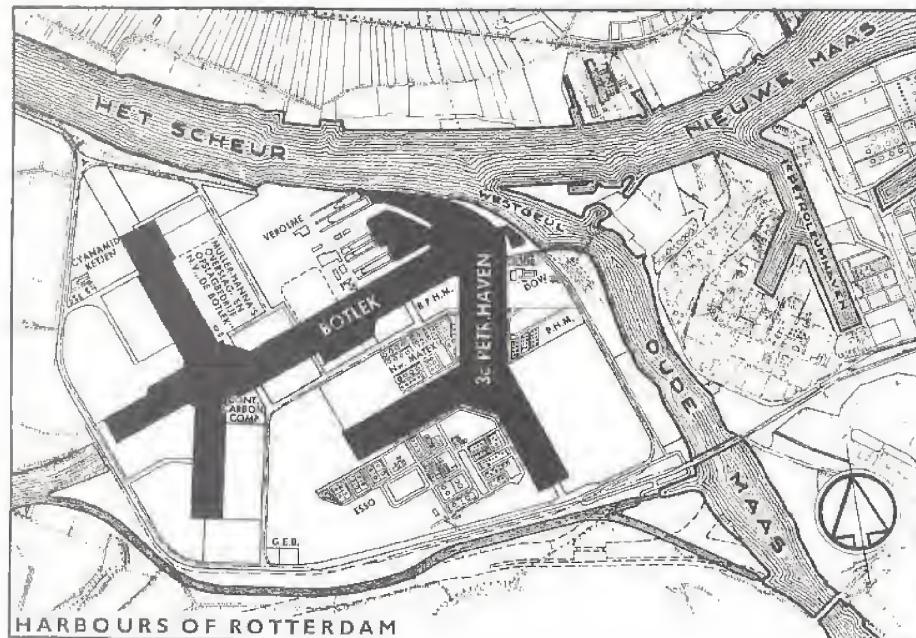
Europort will be used mainly for unloading and for storing oil, and will provide sites for chemical factories as well as for a variety of other industries. Facilities have been provided for storing and handling bulk cargoes, mainly for onward transmission by rail, inland water transport and pipeline.

A canal will be built for the disposal of bulk cargoes arriving from overseas, and will run roughly parallel to the New Waterway. Ocean shipping will thus be kept separate from inland shipping. The plans for this inland waterway also include adoption of the technique of 'pushtowing' now being developed on the Rhine, which will have advantages in handling the increasing volume of bulk cargoes. Even within Europort itself, the specially constructed docks and quays will keep ocean and inland shipping apart. Canal and river vessels will not have to moor in the open waters of the docks in rough weather. A complete rail link-up is also being provided.

Rotterdam's transit trade to the rest of Western Europe has been and is considerably aided by the Dutch Customs system which is designed to ensure the unrestricted passage of goods. Generous facilities for temporary duty-free storage in the port have made Rotterdam 'freer than a free port.'

Post-war trends also allow more scope for expansion of the traditional industries in and around Rotterdam. Engineering, with shipbuilding in the forefront, has long been the nucleus of industrial enterprise. Fifty per cent





of Dutch shipbuilding is located around Rotterdam, with much heavy and light engineering and a variety of other industries.

The chemical industry, which had emerged long before the war, has received a vigorous impulse from the oil industry which supplies the basic materials for modern chemical products, such as synthetic detergents and polyvinyl chloride, dyestuffs and insecticides. Foods and allied products constitute Rotterdam's third industry.

Foreign enterprises and investment in Rotterdam are increasing. Rotterdam as a port, and as an industrial center, is more and more acquiring an international character.

Today the largest shipping-company in Rotterdam is the *N.V. Nederlands-Amerikaanse Stoomvaart Maatschappij (Holland-Amerika-lijn)*, better known as the *Holland-America Line*, with 34 ships (363,516 tons). This line, the name of which is familiar to all Americans crossing the Atlantic by boat, has maintained regular passenger and

freight services between Rotterdam and New York City and other American ports since it was founded in 1873.

The *Van Nievelt, Goudriaan & Co's Stoomvaart Maatschappij* (Van Nievelt, Goudriaan & Co. Steamship Company), with 50 ships (181,420 tons) maintaining freight and passenger services to South America, between South America and West-Africa and in the European area, is another important shipping-company.

Furthermore, the *N.V. Verenigde Nederlandse Scheepvaartmaatschappij* (United Netherlands Navigation Company), of The Hague, with offices in Rotterdam and Amsterdam and a fleet of 44 ships (348,274 tons), maintains passenger and freight services to West, South and East Africa, and the Near East and the Pacific.

An equally large shipping-company in Rotterdam is the *Koninklijke Rotterdamsche Lloyd N.V.* (Royal Rotterdam Lloyd), with 35 ships (333,301 tons), maintaining the same services as the Nederland Line Royal Dutch Mail of Amsterdam.

| Year | Number of Sea-going vessels | Mill. Gen. NRT | Mill. Cargo | Bulk Cargo | Mineral Oils | Total Mill. tons |
|------|-----------------------------------|-------------------|-------------|------------|--------------|---------------------|
|------|-----------------------------------|-------------------|-------------|------------|--------------|---------------------|

| | | | | | | |
|-------|--------|-------|-------|-------|-------|-------|
| 1936 | 12,640 | 20,4 | 6,5 | 22,9 | 2,2 | 31,5 |
| 1938 | 15,360 | 24,7 | 7,8 | 29,5 | 2,9 | 40,2 |
| | | | | | | |
| 1955 | 20,340 | 39,7 | 10,4 | 30,4 | 23,8 | 64,6 |
| 1956 | 21,239 | 43,3 | 9,7 | 33,4 | 27,4 | 70,4 |
| 1957 | 22,028 | 45,0 | 10,9 | 33,2 | 28,4 | 72,5 |
| 1958 | 21,956 | 48,5 | 11,2 | 26,6 | 34,3 | 72,2 |
| 1959 | 23,291 | 49,9 | 13,0 | 24,7 | 31,5 | 69,2 |
| 1960 | 24,344 | 56,9 | 14,3 | 28,9 | 38,1 | 81,3 |
| 1961 | 24,553 | 58,5 | 14,6 | 28,5 | 47,0 | 90,1 |

The safe and ice-free New Waterway has an average depth of 39 feet at ebb tide and is only 18.6 miles long. At high tide this channel is 5½ to 6 ft. deeper.

Rotterdam is rightly called 'The Gateway to Europe'.

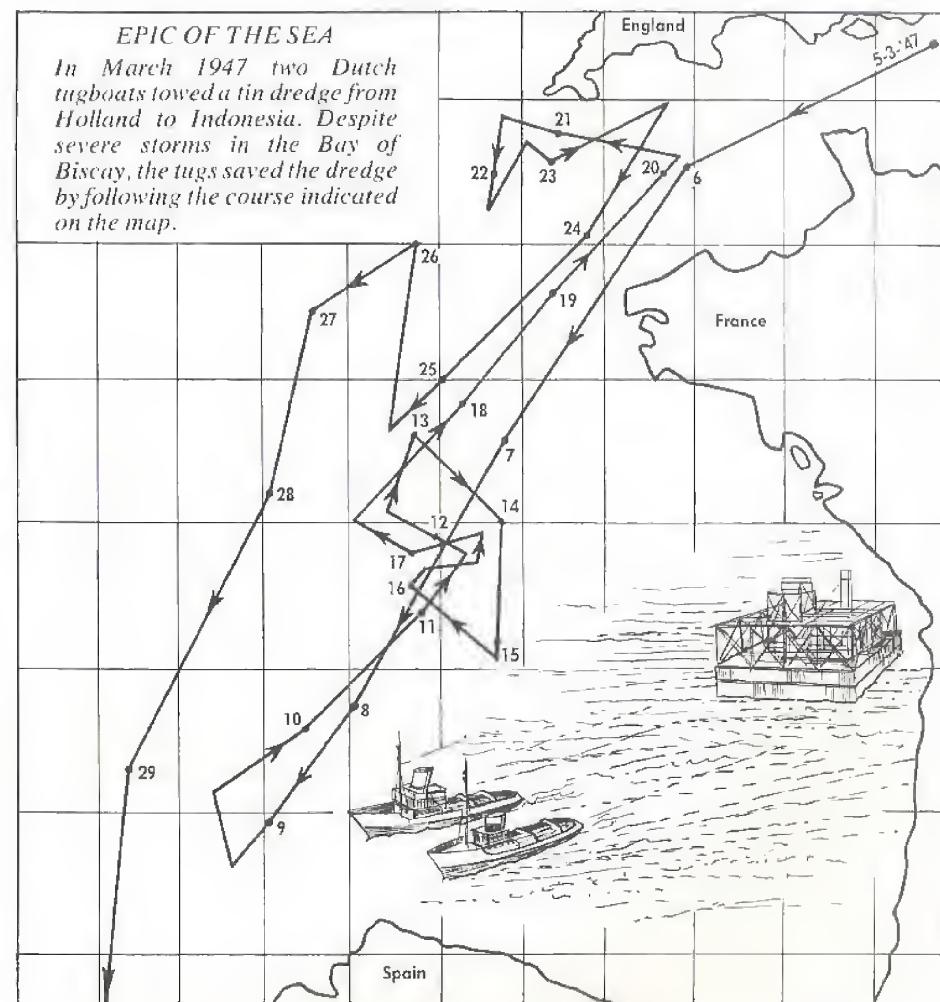
Advantage through necessity. The unending struggle against the onslaught of the sea and the turbulence of their rivers gave the Dutch great experience in dredging operations. By the end of the nineteenth century Dutch engineers had wrested about one million acres of land from the water. Holland's dredging and dredge building industries have their origin in dire necessity. The Dutch have carried out their dredging operations in nearly every country of the world. Even England, which herself specializes in both dredging and in the manufacture of dredging equipment, frequently places orders with the Dutch industry.

Harbor construction is comparatively new, as compared with dredging; 65 years ago the Dutch engaged a foreign firm to build several Dutch harbors. But in 1907 a Dutch concern built the harbor in Shanghai, China. In 1914, another Dutch firm built the breakwaters, mole and quays at Chefoo, North China, and after the First World War, harbor constructions were undertaken in all parts of the world: in Macao, Hongkong, Canton and Amoy in China, in Portugal, Persia, Tasmania, in the Antilles, in Egypt, and elsewhere. Dutch firms also carried out dredging operations in every country in Europe, in Algiers, in Morocco, South Africa, Central and South America, Australia, and Tasmania.

Dutch dredging equipment has kept pace with modern demands. Holland is well known for her sea, dock, and river dredges, tin ore and gold ore dredges. Since ore dredges usually have to operate inland, they must be shipped in sections and assembled when they arrive at their destination.

After the Second World War, six large dredge manufacturers established the Mineral Technology Institute at Delft where experts are studying the behavior of mixtures

of sand, water and other materials in pumps and pipelines, and doing research work on ore separation.





Dutch tugboats towing a dry dock.

Schiphol and the K.L.M. A third port of international importance is Schiphol, the international airport near Amsterdam. Its name appeared on maps as early as 1447. At that time, however, it served to indicate a bay in a large lake, the Haarlem Lake, where many ships fell victim to southwesterly gales.

Since 1920, Schiphol has been one of Europe's major airports for civil aviation. Owned jointly by the Government and the municipalities of Amsterdam and Rotterdam, it is used by 22 foreign airlines, including Pan American World Airways and, of course, by the K.L.M. - Royal Dutch Airlines.

Whatever the Dutch undertake in the way of construction, they always have to begin by solving the serious problems connected with water and water levels. Schiphol is not only part of Haarlemmermeer Polder, the former lake, but is, as it were, a polder within a polder.

The entire landing area is a level grass-surfaced field. However, underneath this field and the runways lies a construction of 415 miles of drainage pipes which run in parallel lines at 23 feet intervals from northwest to southeast. The airport's electrically operated pumping stations keep the water-level in the boundary ditches three feet below the water-level in the canals of the polder.

World War II left Schiphol a total wreck. Terminal buildings and all hangars were demolished, runways were blown up, the landing field was pockmarked with craters. Today Schiphol presents a different picture. It is a modern airport, boasting the most up-to-date facilities and conveniences for the worldly-wise traveller. Schiphol has new and larger hangars, new radio and radar equipment, new runways.

The longest runway measures almost 3,250 yards, and can cope easily with the requirements of intercontinental jet air traffic.

Plans for a further extension of Schiphol as a world airport have been completed. The blueprints are based on the tangential system, in which the runways have been projected at a tangent to the central traffic area. This was first used in Chicago's O'Hare Field and the Buenos Aires airport of 'Ezeiza'. Schiphol's extension plan involves an expenditure of some 250 million guilders, and is expected to be completed in 1965.

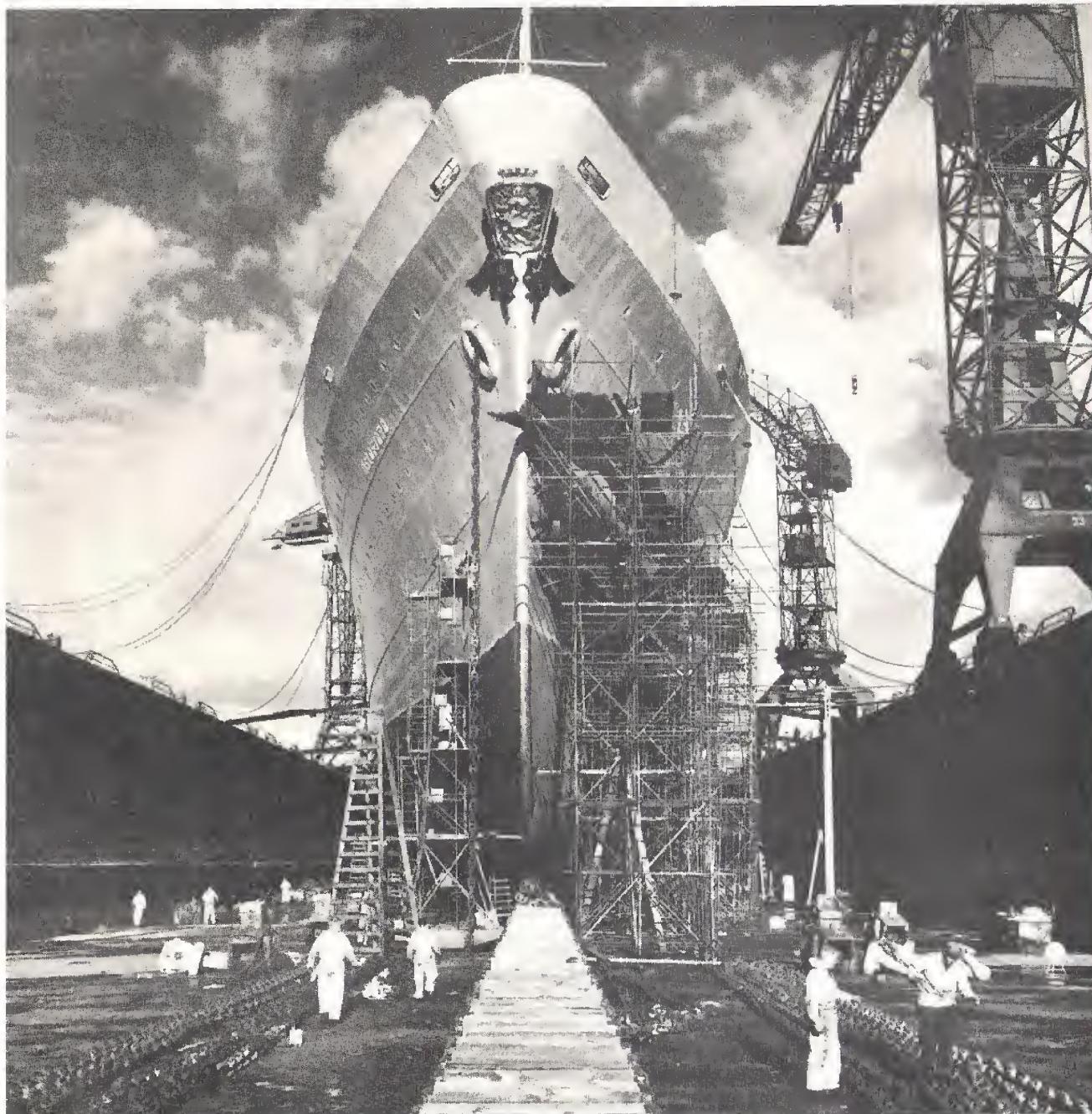
The history of the K.L.M. is, of course, closely connected with the growth of Schiphol. Founded in 1919, it is the oldest and the third largest intercontinental airline in the world.

In 1919, the K.L.M. started with a service to London on alternate days. In the following years the enterprising young company developed rapidly; by 1939 its 8,100 mile network included 36 European cities. From the very beginning the K.L.M. was intent on establishing air connections with countries outside Europe, especially Indonesia. The first flight from Schiphol to Jakarta in October 1924, is a landmark in aviation history. More flights to Indonesia followed, resulting in a two-weekly experimental service in 1929, which became a regular service in September 1930. Until 1940 this was the longest regular air route in the world: nearly 9,000 miles. In the air service from Amsterdam to Jakarta, the K.L.M. had a sound basis for expanding its network. The war, however, put a stop to this development. In 1945 an energetic start was made to restore the old connections. In 1946 the K.L.M. became the first European airline to open a post-war service to New York. The air service to New York has constituted her most important operation for the last few years.

At present the K.L.M. serves 104 cities in 68 countries. It includes Rio de Janeiro, Montevideo, Buenos Aires, Caracas, New York, Johannesburg, Mexico City, Montreal, Houston, Curaçao, Sydney, Tokyo, and Manila. The K.L.M.'s up-to-date fleet consists mainly of fast Douglas DC-8 jets, Lockheed Electra and Vickers Viscount 803 turbo-prop aircraft. In 1961 K.L.M. transported 1,400,000 passengers, 44,700 tons of freight and 4,000 tons of mail.



Schiphol Airport.



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NETHERLANDS INFORMATION SERVICE
A GOVERNMENT AGENCY OF THE NETHERLANDS
MIDWEST DIVISION
NETHERLANDS MUSEUM
HOLLAND, MICHIGAN 49423

This book was written by Dr. H. Rodriguez
for the Netherlands Information Office
in New York.

The second edition was produced by the
Netherlands Government Information
Service in The Hague.

Printed in Holland.

2100130